

# **Applications of XAFS and XRF measurements for investigating geological materials and systems at high temperature and pressure**

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Silicate melts and aqueous fluids play a key role in the evolution of the Earth's crust and mantle. Melt and fluid generation and subsequent ascent are major geological processes in the crust and in subduction zones, leading to large-scale mass and energy transfer in the Earth's interior and abundant volcanic activities on the surface. Knowledge of the physical and chemical properties of these systems is essential for a better understanding and modeling of these processes.

Sulfur is an important component in the gas plume released during volcanic activity, which has strong impact on the Earth's atmosphere. The budget of sulfur, which can be carried by natural melts is dependant on redox conditions. Thus, an example will be shown on the characterization of redox equilibria of sulfur in silicate melt of natural composition using XANES methods [1].

Interaction of solids with aqueous solutions in the deep Earth is an important step in the transport of matter within the Earth. Synchrotron micro-XRF and diamond anvil cells used in-situ at high pressure and temperature are used to better understand the solubility behavior of rutile at these conditions [2].

[1] Wilke, Jugo, Klimm, Susini, Botcharnikov, Kohn, Janousch (2008) *American Mineralogist*, 93, 235-240

[2] Manning, Wilke, Schmidt, Cauzid (submitted) *Earth and Planetary Science Letters*